

# VIKING AND MARS ROVER EXOBIOLOGY

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Other than Earth, Mars is the planet generating the greatest interest among those researching and contemplating the origin and distribution of life throughout the universe. The similarity of the early environments of Earth and Mars, and the biological evolution that we know occurred on early Earth provide the motivation to seriously consider the possibility of a primordial Martian biosphere.

In 1975 the Viking project launched two unmanned spacecraft to Mars with the intent of finding evidence of the existence of present or past life on this planet. Three Viking Biology experiments were employed: the Labeled Release experiment, the Gas Exchange experiment, and Pyrolytic Release experiment. Each of these three experiments tested for microbial existence and utilization of a substrate by examining the gases evolved from specific chemical reactions. Although the results of these experiments were inconclusive, they inferred that there are no traces of extant life on Mars. However, the experiments did not specifically look for indications of extinct life. Therefore, most of the exobiologic strategies and experiments we suggest for the Mars Rover Sample Return Mission involve searching for signatures of extinct life. The most significant biological signatures and chemical traces to detect include: isotopic and chemical signatures of metabolic activity, anomalous concentrations of certain metals, trace and microfossils, organically preserved material, carbonates, nitrates and evaporites.